

DESCRIPTION

The bidder shall furnish a suitable weatherproof cabinet and terminal facility.

Each new cabinet and terminal facility shall be provided completely wired by the manufacturer, with all internal components (such as back panels, shelves, terminal strips, harnesses, etc.) as well as all mounting hardware necessary to provide installation as described herein. Each new cabinet and terminal facility shall be fully assembled. Interconnections for the internal equipment complement shall be provided via the cabinet and terminal facility harness by means of mating "MS" type connectors and shall be performed by the manufacturer. Wiring and cabling addition to new units in the field are expressly prohibited. "D" connector may be used as stated in the construction details.

MATERIALS**FUNCTIONAL REQUIREMENTS**

The cabinet and terminal facility shall provide a weatherproof enclosure for all internal equipment. All equipment except detectors shall be shelf mounted and all terminal and panel facilities shall be placed on the lower portion of the cabinet walls below all shelves.

The manufacturer shall submit a cabinet layout for each type of cabinet for review by the Engineer. Only cabinets with approved layouts will be accepted under this project.

Each cabinet shall at a minimum be supplied with the following facilities as required:

- 1) Main Switch and/or Breaker
- 2) Radio Interference Filter and Suppressor
- 3) Surge protection (for Solid State Equipment) and Isolation
- 4) Solid State Switches

Detector rack, a minimum of six slots for dual channel units for loop detectors, rack's slots for power supplies and slot for "Flash Module". The rack shall be hinged to swing out and wired as required to the various terminals.

- 6) Conflict Monitor (12 channel) see Spec. 686.8038
- 7) Flasher
- 8) Police Panel (with Main Switch, Auto-Manual Switch, Signal shutdown Switch, Auto-Flash Switch, Manual Control Switch)
- 9) Service Panels and Terminal Blocks

- 10) Interconnect Harness
- 11) Ventilation Fan, Vents and Filter
- 12) Thermostatically Controlled Heater
- 13) Door Actuated Switch

Cabinets are to be designed for rack mounted loop detector amplifier modules and shall be furnished with the required racks and rack detector amplifier power supplies in accordance with detector specification.

VENTILATION

All cabinets shall be furnished with suitable top and bottom vents. The vents shall be designed to prohibit the entry of rain, insects and other foreign objects.

All cabinets shall be equipped with a thermostatically controlled ventilation fan. The fan shall have a minimum rating of 150 cubic feet per minute. The thermostat shall be adjustable from 70 degrees F to 160 degrees F. Replaceable air filters shall be mounted directly behind the door vent. The fan shall have a protective grill to prevent injury to maintenance personnel.

All cabinets shall be equipped with a thermostatically controlled heater. The thermostat shall be adjustable from 0 degrees F to 50 degrees F. The heater shall be rated at 250 watts (no bulbs shall be used) and shall be designed, positioned and protected so as to prevent harm to operating personnel.

POLICE PANEL

All cabinets shall be furnished with a police compartment within which shall be located:

- 1) Main Switch to remove power from all portions of the control equipment circuitry;
- 2) Signal Shutdown Switch located on the inside of cabinet doors to remove signal power only and allow the controller unit to cycle;
- 3) Auto-Flash Switch to cause the controller to operate the intersection in its pre-programmed flashing mode;
- 4) Auto-Manual Switch which will apply a stop time command to the controller unit and connect the manual control push-button switch to the manual control input;
- 5) A Manual Control Switch on a 6' long coiled cord which will advance the controller when Auto-Manual Switch is operated. The cord shall be jack-mounted to permit

removal from the police panel compartment. One cord shall be provided for each controller.

DOOR ACTIVATED SWITCH

The cabinet shall be provided with a door actuated, hermetically sealed microswitch. The switch shall be wired to spare terminals on the terminal facility and shall provide a dry contact closure across these terminals when the cabinet door is opened.

REMOTE OR TIME CLOCK FLASH

The cabinet shall be capable of receiving inputs for flashing operation from a remote or time clock command. The initiating and termination of flashing operation shall be in accordance with the M.U.T.C.D.

MANUAL FLASH OPERATION

The manual flash switch shall extinguish all signal indications except power to the yellow and red signals to permit programmable emergency flashing operations. The power supply to the controller shall not be affected and the controller shall continue to operate normally.

SOLID STATE LOAD SWITCHES

The solid-state load switches shall be triple-signal load switches as specified in NEMA Pub. TS-1-83 and shall be jack-mounted in compliance with NEMA Pub. TS-1-83. Each solid-state load switch shall be furnished with three built-in indicator lights for phase identification. Positive means shall be provided to retain the above referenced load switches and flashers in the terminal facility and prevent their "walking" or falling out of the load switch sockets.

As a minimum, terminal facilities shall be wired and configured for load switches as listed below:

Eight Phase Actuated 16 Load Switch Packs

A load switch pack will be provided for each load switch pack position.

The individual solid state load switches in each switch pack shall be rated for 25 amps. The internal wiring and layout of the switch pack must be approved by the County E.I.C.

FLASHER AND FLASH RELAY

A double circuit flasher shall be furnished with all cabinets and shall produce between 50 and 60 flashes per minute and shall provide on and off intervals. Both the flasher and flasher relay shall be by plug-in mounting. Flasher shall be type 3 in conformance with NEMA TS-1-1983.

The flasher relay shall energize the flasher and transfer signal light circuits from controller unit to flasher. All bearings and moving parts used in the flasher units shall be approved sealed bearings of such design that lubrication shall not be necessary. Flash relays shall be physically and functionally interchangeable with Midtex #136-4995 or equal.

It shall be possible to disconnect the controller without interfering with the flash operation.

MECHANICAL REQUIREMENTS

SIZE

Cabinets shall be provided in the following sizes:

<u>Type/Size</u>	<u>Height (in)</u>	<u>Width (in)</u>	<u>Depth (in)</u>
P see detail "B"	54	45	23

Type P cabinets shall be fabricated from (minimum) .125" reinforced aluminum. The cabinet may be cast from aluminum with a minimum wall thickness of 3/16". In all cases, the cabinets furnished shall have clean cut, smooth appearance. All welds, mold marks, etc., shall be ground smooth and/or sanded to effect this requirement.

All County cabinets shall be painted with three coats of high quality aluminum gray over a suitable primer coat. *(see special note)

All coating shall be commercially smooth, substantially free of flow lines, paint washout, streaks, blisters, and other defects that would impair service-ability or detract from general appearance. The coatings shall comply with the following requirements:

Coating Hardness - The finish shall have a pencil lead hardness of HB minimum using a Eagle Turquoise pencil.

Salt Spray Resistance - The undercutting of the film of the coating system shall not exceed 1/8 inch average, from lines scored diagonally and deep enough to expose the base metal, after 350 hours exposure in a salt spray cabinet in accordance with ASTM B117.

DOOR

The main door of all cabinets shall include substantially the full area of the front of the cabinet. All doors shall be reinforced on the inside in such a manner as to prevent warping.

Door for fabricated cabinets shall be hinged on the right hand side by means of three (3) butt hinges with 1/4" (min.) stainless steel hinge pins. Doors for cast cabinets shall also hinge on the right side and utilize stainless steel hinge pins. Alternate hinging methods will be considered for approval. A gasket bead shall be installed on the inside of the door,

which together with the neoprene air-cored cabinet gasket, shall form a weather-tight seal between the housing and the cabinet door. The moving bars or rods shall be Teflon coated where they make contact with other parts or bearing surfaces.

LOUVER SLOTS

In door 16" X 20" X 2" lip and two retainer springs to hold filter (2 X 16 X 20 filter).

CABINET MOUNTING AND SHELVING

- 1) 2 - .125 aluminum shelves
- 2) Adjustable rack mounting bracket
- 3) Back panel support brackets, A.O.B.E.

LOCK ASSEMBLY

The three point lock assembly shall be made of 5/8" stock minimum. The door handle shall be made of material with a 5/8" minimum thickness.

MAIN DOOR

The main door for all cabinets shall be equipped with a cylinder lock keyed for a Corbin key, with a dust cover. In fabricated cabinets, the lock shall engage a cam controlling a three-point locking system for the main door. The cam shall be activated by a cast aluminum (or approved equal) handle having an arm radius of at least six inches. The cam mechanism shall be designed to reduce "leverized" pressure on the lock tongue from attempts to force the handle. The handle travel shall not extend over the lock cylinder access.

Door catches shall be supplied to hold the door in an open position of 135 degrees, plus or minus ten degrees. The catch shall manually engage and hold the door open until released.

** See special note

POLICE DOOR

All cabinets shall be furnished with full doors and an auxiliary door equipped with a lock for a police key. Neoprene gasketing and stainless steel hinge pins shall be provided.

MOUNTING HARDWARE

All cabinets shall be furnished with mounting plates and other necessary hardware to basemount the cabinet, such as 1/4 hard rubber gasket that matches the bottom of the cabinet.

KEYS

One key shall be furnished for each cabinet lock, plus a police key. The lock shall be a Corbin "Conn 1"

**** Special Note:**

Door handle and opening hardware shall be bid as two methods of construction.

1. Standard handle
2. Special handle that is removable from the outside after opening or closing the door, so as to make the face of door surface flush except for the police door panel. A protective opening cover shall cover the opening for the handle.

ELECTRICAL REQUIREMENTS

CIRCUIT BREAKER

The circuit breaker shall be approved and listed by Underwriters Laboratories. The operating mechanism shall be enclosed, trip free from operating handle on overload, and trip indicating. Contacts shall be silver alloy enclosed in an arc quenching chamber. Each cabinet shall have, as a minimum, a circuit breaker rated at 15 amperes to protect the vent fan and duplex outlet. In addition, a circuit breaker rated at 40 amperes shall be furnished to protect all other equipment except at locations where otherwise specified. Circuit breakers shall be unaffected by ambient temperature range, relative humidity, applied power shock and vibration range specified in NEMA TS-1-1983. Breakers shall have a minimum interrupt capacity of 5000 amperes.

RADIO INTERFERENCE SUPPRESSOR

All cabinets shall be equipped with a radio interference suppressor installed at the Circuit Breaker. The suppressor shall provide a minimum attenuation of 50 decibels over a frequency range of 200 kilocycles to 75 mega-cycles. The suppressor shall be hermetically sealed in a substantial metal case, filled with a suitable insulation compound.

The suppressor terminals shall be nickel plated, 10-24 brass studs of sufficient external length to provide space for connection of two No. 8 AWG conductors and shall be so mounted that the terminals cannot be turned in the case. The suppressors shall be designed for operation on 50 amperes, 125 volts, 60 Hertz, single phase operation and shall be approved by UL and EIA.

WIRING

All cabinet wiring where connected to terminal strips, flasher, relays, switches, radio interference suppressor, etc., shall be identified by the use of hot stamping of the wire or

approved equal, before attachment of the lug or making the connection. The wire shall carry the proper identification number so that a translating sheet will not be required.

All wires shall be cut to the proper length before assembly. No wires shall be doubled back to take up slack, except for the conflict monitor. Wires shall be neatly laced into cables with nylon lacing. Cables shall be secured with nylon cable clamps. The grounded side of the electric service shall be carried throughout the cabinet without a break.

SPECIAL REQUIREMENT

All cable harness shall have a loop of wire left in the harness, so that the main wiring panel can be lowered without disconnecting the harness from the interior cabinet.

All electrical connections in the cabinet, including relays, flasher, terminal strips, etc., shall have sufficient clearance between each terminal and cabinet to provide an adequate distance to prevent a leakage path or physical contact under stress. Where these distances cannot be maintained, barriers must be provided. A clearance of 2" will be kept between all ground and A.C. Power points.

All equipment grounds shall run directly and independently to the ground buss. The lay of the interconnect cable between the components must be such that when the door is closed, it does not press against the cables or force the cabinets against the various components inside the cabinet.

Terminals used for field connections shall secure conductors by means of a #8-32 nickel or cadmium plated brass binder head screw. Terminals used for interwiring connections, but not for field connections, shall secure conductors by means of a #6-32 nickel or cadmium plated brass binder head screw.

As a minimum, all connections to and from the controller unit shall terminate to an interwiring type block. These blocks will act as intermediate connection points for all controller unit I/O.

DUPLEX OUTLET

Each cabinet shall be supplied with a NEMA type 5-15R duplex receptacle equipped with integral ground fault interrupting circuit as defined in the national electrical code, and a bulb outlet with switch and 100 watt bulb.

SURGE PROTECTION AND ISOLATION

A gas discharge surge arrester shall be provided to reduce the effect of voltage transients on the applied power line. It shall have the following characteristics:

Recurrent Peak Voltage

212 volts

Energy Rating, Maximum	20 joules
Power Dissipation, Average	15 watts
Peak Pulse Current (6 microsecond pulses)	2000 amperes
Standby Current for 60 Hz Input	1 ma.

The surge arrester shall be installed after the circuit breaker and line filter.

Isolation shall be provided for field inputs, such as pedestrian button, auxiliary detector inputs and others by opto coupler units.

ISOBLOK ISOLATION

An A.C. secondary power unit or rack will be mounted in the cabinet that will supply the total A.C. power to all control units with secondary spike protection.

The unit or rack shall have as a minimum four outlets or power points of 15 amps each rating, with breaker protection.

The unit or rack performs the following:

HIGH VOLTAGE SPIKE PROTECTION:

Handles up to 13,000 ampere peak capacity. Spike protection works between hot, ground, and neutral.

RAPID RESPONSE TIME: Less than 5 nanoseconds.

COMMON AND TRANSVERSE MODE CAPACITORS:

PROTECTION: Filter network protect between hot, ground and neutral lines.

HIGH FREQUENCY NOISE SUPPRESSION:

response capacitors that Greater than 20 db @ 50 Khz

Greater than 40 db @ 150 Khz

Greater than 80 db @ 1 Mhz
-Center screw mounting to

Greater than 30 db from 6 MHz

MULTIPLE FILTERS: Each contains: Metal oxide varistors - for high voltage spikes Torroidal chokes- each designed to carry a full 15 amp load without magnetic saturation.

HIGH FREQUENCY

work with chokes to attenuate high frequency disturbances.

VHF CAPACITORS: rapid

suppress high frequency.

Additional Requirements:

-Power protection indicator

-Power present indicator

bracket prevents

accidental
to 1000 MHz unplugging it outlets are

used for power points.

The unit or rack shall be U.L. approved and be approved by the engineering section for Traffic Signals.

TRANSFORMER A.C. POWER ISOLATION

A 2.5 KVA Isolation Transformer shall be installed between the incoming A.C. power and the Isoblok Isolation unit or rack. The unit shall be U.L. approved single phase, for 60 Hertz operation and a maximum of 135 volts.

HARNESS REQUIREMENTS

All wiring containing line voltage A.C. shall be routed and bundled separately and/or shielded from all low voltage, i.e. control circuits. All conductors and live terminals or parts, which could be hazardous to maintenance personnel, shall be covered with suitable insulating material.

All conductors used in controller cabinet wiring shall be #22 AWG or larger with a minimum of 19 strands. Conductors shall conform to MIL SPEC #MIL-W-16878D type B or D. The insulation shall have a minimum thickness of 10 MILS. All wiring containing line voltage shall be a minimum size of #14 AWG, or the suitable size.

The A.C. return and equipment ground wiring shall be electrically isolated from each other and the A.C. + wiring by an insulation resistance of at least 10 Megohms when measured at 250 V.A.C. A.C. return and equipment ground wiring shall be color coded white and green respectively.

All inputs and outputs which are wired to a connector on a module shall be terminated at a terminal block in the controller cabinet.

TERMINAL BLOCKS

Terminal strips located within the cabinet shall be accessible to the extent that it shall not be necessary to remove the controller from the cabinet to make an inspection or connection. Terminal blocks shall be two position multiple pole barrier type. Shorting bars shall be provided in each of the positions provided along with an integral marking strip or equal.

Terminal blocks shall be so arranged that they shall not upset the entrance, training and connection of incoming field conductors. All terminals shall be suitably identified by legends permanently affixed and attached or silk screened. Not more than three conductors shall be brought to any one terminal screw. No electrically alive parts shall extend beyond the protection afforded by the barriers. A majority of the terminal blocks shall be installed on a main back panel. This back panel shall be hinged on the bottom so the panel can be unbolted at the top and dropped forward, so as to allow one room enough to work on the

backside of the panel.

AC return and equipment ground wiring shall terminate to buss bars. Each buss bar shall have a minimum of 20 contact points, each capable of securing at least one #10 conductor or be at least 2 inches away from any A.C. Power points.

MERCURY CONTACTOR

A mercury contactor, rated at a minimum of 50 amperes, shall be furnished to break the feed to the signal power buss (solid state load switch power feed). This contactor shall be utilized to disconnect AC power from the signal buss when operation so requires.

CONNECTING HARNESSES

Terminal facilities shall be provided with harnesses of appropriate length, terminated to connectors of the MIL-26482 series, to allow the placement of the controller and monitor units anywhere within the cabinet specified for the controller. Cabinets that require RCU harness need the harnesses as specified under Appendix "C".

The cabinet shall have sufficient harness and connector so existing County owned controller equipment can operate in the cabinet, such as Safetran CA-1601 and an Econolite KMC-8000.

All wiring including spare wires will be terminated to pins in connectors or terminal blocks.

The cabinet shall also contain a harness that will connect to RS-232 connector on the controller for system communication for upload or down loading the controller.

ENVIRONMENTAL REQUIREMENTS - CABINETS AND TERMINAL FACILITIES

Cabinets and terminal facilities shall meet the environmental conditions required of field equipment as specified in the equipment "Special Requirements", Section 6, County of Monroe, Electronic Equipment, Paragraph 6.1.4.1.

QUALITY ASSURANCE PROVISIONS - CABINETS AND TERMINAL FACILITIES

Cabinets and terminal facilities shall meet the factory acceptance test requirements as specified in the equipment special note. Design approval tests shall be as specified for temperature and humidity. The bidder shall prepare test procedures and data forms for approval by the Engineer.

METHOD OF MEASUREMENT

Cabinets together with their associated terminal facilities, after inspection and acceptance by the Engineer will each be measured as a single unit.

BASIS OF PAYMENT

Payment for each cabinet and its associated terminal facilities will be made for the measured quantity at the contract price for each. The unit price shall be full compensation for furnishing, transporting, labor, tools, materials, equipment and incidentals necessary, including racks, rack detector power supplies and conflict monitor. Sixty-five (65) percent of the contract bid price shall be paid upon delivery. Thirty-five (35) percent shall be paid upon satisfactory functional testing by Monroe County after delivery. Functional testing shall be performed within ninety days from delivery.

*Special Note: The following steps shall be taken to prepare the cabinet for painting, as an example the Dupont "Ipon" Polyurethane Paint System or the iron phosphate method

DUPONT "IMRON" POLYURETHANE PAINT SYSTEM

- 1) Sand surface with Scotchbrite orbital sander to remove sheen.
- 2) Wash with Aluma-Prep.

NOTE: Steps 1 & 2 alternate is acid bath.

Damp wipe with thinner that is used with polyurethane finish color.

- 4) Prime paint with Surfa Bond Primer.
- 5) Three coats of "Dupont Imron System Polyurethane" (Silver metallic 44434UH).
- 6) Follow Dupont Imron Polyurthane System instructions for additives, applications and drying time.

SOURCES:

Aluma-Prep
33 (Stock #DX533)
Amchem Products, Inc.
Ambler, PA 19002

Ferrothane
Surfa-Bond for aluminum bonding coat
The Flecto Co., Inc.
Oakland, CA 94694

E.I. Dupont DeNemours & Co., Inc.
Refinish Sales
Wilmington, Delaware

IRON PHOSPHATE PAINTING METHOD

Painted cabinets shall be treated with three (3) stage iron phosphate coating and forced air dried. The finish coat shall be a baked alkali enamel coat.

A polyester powder spray and bake can be used in lieu of paint, upon approval by the Engineer.